

What Is Claimed Is:

1. An instrument for attaching a graft to an aorta or other tubular structure, the instrument comprising:

a first needle assembly for breaching the aorta to provide a hole in a wall thereof;

a carrier portion for insertion of an end of a tubular graft through the hole and into the aorta;

arms pivotally mounted on the instrument and moveable from a position extending axially of said carrier to a position extending radially from said carrier to spread the end of the tubular graft radially outwardly from a tubular body portion of the graft to form a generally annular flange portion extending outwardly from the tubular body portion, and to support the flange portion within the aorta and around the hole therein; and

a second needle assembly adapted to retain suture material therein and to advance the suture material into engagement with the aorta wall and the graft

flange portion for suturing the graft flange portion to the aorta wall.

2. The instrument in accordance with claim 1 wherein said second needle assembly includes a suture needle for penetrating the aorta and the graft flange portion.

3. The instrument in accordance with claim 2 wherein the suture material is disposed in the suture needle and exits the suture needle to engage the aorta wall and the graft flange portion.

4. The instrument in accordance with claim 1 wherein said second needle assembly includes a tube for retaining the suture material, and the suture material is provided with a sharp distal end for penetrating the aorta and the graft flange portion.

5. The instrument in accordance with claim 1 wherein said flange portion of said graft is provided with holes therein and said arms are provided with

abutments which engage the holes to carry the graft into the aorta.

6. An instrument for attaching a graft to an aorta or other tubular structure having a hole in a wall thereof, the instrument comprising:

a carrier portion for insertion of an end of a tubular graft through the hole and into the aorta;

arms pivotally mounted on the instrument and moveable from a position extending axially of said carrier portion to a position extending radially from said carrier portion to spread the end of the tubular graft radially outwardly from a tubular body portion of the graft to form a generally annular flange portion extending outwardly from the tubular body portion, and to support the flange portion within the aorta and around the hole therein; and

a needle assembly disposed on the instrument and adapted to retain suture material therein and to advance the suture material into engagement with the aorta wall and the graft flange portion for suturing the graft flange portion to the aorta wall.

7. The instrument in accordance with claim 6, wherein said carrier portion is provided with a stop for preventing the carrier portion from extending through the aorta to a wall opposite the hole.

8. The instrument in accordance with claim 6 wherein said carrier portion is provided with a balloon member adapted for expansion to fill the hole.

9. The instrument in accordance with claim 6 wherein in addition to said needle assembly disposed on the instrument, at least one further needle assembly is disposed on the instrument and adapted to suture the graft flange portion to the aorta wall simultaneously with said needle assembly.

10. The instrument in accordance with claim 9 wherein said needle assemblies comprise a circular array of needle assemblies operable to simultaneously effect suturing of the graft flange to the aorta wall around the hole.

11. A method for fixing a graft to an aorta or other tubular structure, the method comprising the steps of :

providing a graft having a tubular body portion and an annular flange portion at one end of the tubular body portion;

providing an instrument having a first needle assembly for breaching the aorta, for positioning the flange portion of the graft adjacent a wall of the aorta, and for suturing the graft flange portion to the aorta;

mounting the graft in the instrument;

mounting a second needle assembly, supporting suturing material, on the instrument;

operating the instrument to breach the aorta to provide a hole therein;

operating the instrument to move the graft to engage the aorta around the hole with the graft flange portion;

operating the instrument to provide anvil support to the graft flange portion within the aorta; and

operating the instrument to effect suturing of the graft flange portion by the second needle assembly onto the aorta around the hole in the aorta.

12. The method in accordance with claim 11 wherein the steps of moving the graft to engage the aorta with the graft flange portion, and of providing anvil support to the graft flange portion, comprise moving arms pivotally mounted on a graft carrier portion of the instrument from a position extending axially of the carrier portion to a position extending radially of the carrier portion, the arms thereby spreading the flange portion into the position adjacent the aorta wall.

13. A method for fixing a graft to an aorta or other tubular structure, the method comprising the steps of:

cutting a hole in a wall of the aorta;

providing a graft having a tubular body portion and an annular flange portion at one end of the tubular body portion;

providing an instrument for positioning the flange portion of the graft adjacent the hole and the wall of the aorta, and for suturing the graft flange portion to the aorta;

mounting the graft in the instrument;

mounting a needle assembly, supporting suturing material, on the instrument;

operating the instrument to move the graft to engage the aorta around the hole with the graft flange portion;

operating the instrument to provide anvil support to the graft flange portion within the aorta; and

operating the instrument to effect suturing of the graft flange portion by the suture needle assembly onto the aorta around the hole in the aorta.

14. The method in accordance with claim 13 wherein the steps of moving the graft to engage the aorta with the graft flange portion, and of providing anvil support to the graft flange portion, comprise moving arms pivotally mounted on a graft carrier portion of the instrument from a position extending

axially of the carrier portion to a position extending radially of the carrier portion, the arms thereby spreading the flange portion and supporting the flange portion in the position adjacent the aorta wall.

15. A method for fixing a graft to an aorta or other tubular structure, the method comprising the steps of:

cutting a hole in a wall of the aorta;

providing a graft having a tubular body portion and an annular flange portion at one end of the tubular body portion;

providing an instrument for positioning the flange portion of the graft adjacent the hole and the wall of the aorta, and for suturing the graft flange portion to the aorta;

mounting the graft in the instrument;

mounting a needle assembly, supporting suturing material, on the instrument;

operating the instrument to move the graft to engage the aorta around the hole with the graft flange portion;



operating the instrument to provide anvil support to the graft flange portion within the aorta; and

operating the instrument to effect suturing of the graft flange portion by the suture needle assembly onto the aorta around the hole in the aorta.

16. The method in accordance with claim 15 wherein the steps of moving the graft to engage the aorta with the graft flange portion, and of providing anvil support to the graft flange portion, comprise moving arms pivotally mounted on a graft carrier portion of the instrument from a position extending axially of the carrier portion to a position extending radially of the carrier portion, the arms thereby spreading the flange portion and supporting the flange portion in the position adjacent the aorta wall.

17. The method in accordance with claim 15 wherein the step of cutting a hole in a wall of the aorta is accomplished by a needle having a guidewire therein, and including the steps of inserting the guidewire into the aorta and withdrawing the needle

from the guidewire after the cutting of the hole, and mounting the instrument on the guidewire and in part in the hole.

18. The method in accordance with claim 17 and including the step of inserting a catheter into the instrument and on the guidewire, the catheter having a balloon on a distal end thereof, and advancing the catheter on the guidewire to place the balloon at least in part in the aorta.

19. The method in accordance with claim 15 wherein the step of mounting a needle assembly on the instrument comprises mounting a plurality of needle assemblies on the instrument, and the step of effecting suturing comprises effecting a plurality of suturings simultaneously.

20. The method in accordance with claim 19 wherein the plurality of needle assemblies is mounted in circular fashion on the exterior of the instrument and the plurality of suturings is undertaken

simultaneously and is disposed in a circle around the hole and in the graft flange and aorta wall.

21. An instrument according to claim 1 wherein said suture material comprises a coil fastener.

22. An instrument according to claim 6 wherein said suture material comprises a coil fastener.

23. A method according to claim 11 wherein suturing is effected by deployment of a coil fastener.

24. A method according to claim 13 wherein suturing is effected by deployment of a coil fastener.

25. A method according to claim 15 wherein suturing is effected by deployment of a coil fastener.